

## **EXHIBIT E**

UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF TEXAS  
MARSHALL DIVISION

IP CO., LLC, d/b/a INTUS IQ,	)
	)
Plaintiff,	) CIVIL ACTION FILE
	)
v.	)
	)
SENSUS USA INC., and TRILLIANT	) NO. 2:09-cv-037-DF
NETWORKS, INC.,	)
	)
Defendants.	)
	)

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**DECLARATION OF DR. SAMIR R. DAS**

1. My name is Dr. Samir R. Das. I am over the age of 21 and am competent to testify to the matters contained herein, and, if called to testify, I could and would testify as set forth herein.
2. I have been retained by Plaintiff IP CO, LLC d/b/a Intus IQ (“Intus IQ”) to give expert opinions and technical advice on the construction of certain terms found in the claims of U.S. Patent Nos. 6,249,516 (the ‘516 Patent) and 7,054,271 (the ‘271 Patent) (collectively “the Patents-in-Suit”).
3. My *curriculum vitae* is attached hereto as Attachment 1.
4. I am currently a Professor of Computer Science and the Director of the Systems and Infrastructure Division, Center of Excellence on Wireless and Information Technology (CEWIT) at the State University of New York (SUNY) at Stony Brook. I received my Ph.D. in Computer Science from the Georgia Institute of Technology in 1994; my Master of Science in

Computer Science in 1993, also from the Georgia Institute of Technology; my Master of Engineering in Computer Science & Engineering from the Indian Institute of Science (India) in 1988; and my Bachelor of Engineering in Electronics & Telecommunication Engineering from Jadavpur University (India), in 1986.

5. At SUNY Stony Brook, I teach and perform research on computer networking topics, specifically focusing on wireless networks.

6. I have read the Patents-in-Suit, including the detailed descriptions, drawings, and claims. I have also reviewed and considered the prosecution histories relating to the Patents-in-Suit and the Federal Circuit's decision in Phillips v. AWH Corp., 415 F.3d 1303, (Fed. Cir. 2005) (en banc). I have also reviewed the prosecution histories for patent applications related to the Patents-in-Suit, including those prosecution histories for application serial number ("SN") 11/300,902 (a continuation application of the '271 Patent); SN 90/008,011 (the reexamination of U.S. Patent No. 6,044,062, the parent of the Patents-in-Suit); SN 90/008,005 (the reexamination of the '516 Patent); 08/760,895 (a parent application of the Patents-in-Suit); and SN 09/492,933 (a parent application of the '271 Patent).

7. In my opinion, a person of ordinary skill in the art to which the Patents-in-Suit pertain is a person, at or around the time of the invention (the mid 1990s), having a bachelor's degree in electrical engineering, computer engineering, computer science or a related field, including coursework on computer networks, and one or both of the following: (1) several years of experience relating to the design and development of large wireless computer network installations; or (2) a graduate degree in electrical engineering, computer engineering, computer science or a related field, including coursework on computer networks, with some knowledge of large wireless computer networks. I am at least one of ordinary skill in the art and, in

connection with my teaching and related work within this field, I interact with others with the aforementioned level of skill in the art.

8. I have been asked to offer my opinion regarding what a person of ordinary skill in the art would understand certain terms of the Patents-in-Suit to mean. Specifically, I have been asked to provide my opinion regarding what a person of ordinary skill in the art would understand the following claim terms to mean:

- “path to the gateway through the fastest clients” of claims 1, 6, and 15 of the ‘516 Patent;
- “path to the gateway through the clients with the least amount of traffic” of claims 1, 6, and 15 of the ‘516 Patent;
- “path to the gateway through the most robust additional clients” of claims 1, 6, and 15 of the ‘516 Patent;

9. It is my opinion that a person of ordinary skill in the art would readily understand the meaning of each of the above-mentioned terms. Furthermore, those meanings are consistent with the use of the terms in the patents themselves. My opinion regarding the meaning of each of the terms is provided in detail below.

10. With respect to the term “path to the gateway through the fastest clients” of claims 1, 6, and 15 of the ‘516 Patent, it is my opinion that a person of ordinary skill in the art would understand this term to mean “the path to the gateway through the clients having the highest packet transmission and/or computing speed.” I base this opinion on both my general understanding of the terminology and on my understanding of the system described in the ‘516 Patent, which is focused on packet transmission, and more particularly on the optimization of packet transmission in a network, including, for example, the description from Column 8, lines

29-40<sup>1</sup> and Column 9, lines 6-19.<sup>2</sup> In addition, the word “fastest” would be understood by a person of ordinary skill in the art to refer to the speed with which a client can transmit a packet based on transmission speed, for example, as measured in Kilobits per second (Kbps), and/or the computing speed of the client itself.

11. With respect to the term “path to the gateway through the clients with the least amount of traffic” of claims 1, 6, and 15 of the ‘516 Patent, it is my opinion that a person of ordinary skill in the art would understand this term to mean “path to the gateway through the clients having the lowest volume of packets transmitted through the client per unit time.” As discussed above, the ‘516 Patent is focused in part on the optimization of packet transmission in a network. See, e.g., Col. 5, ll. 11-18; Figures 2a-2g, 2h'-2h", and 2i-2o; Col. 9, ll. 6-24. A factor upon which optimization can be based is packet transmission through clients with the least amount of traffic. Based on my understanding of both the ’516 Patent and the term “traffic,” it is my opinion that a person of ordinary skill in the art would understand that “traffic” is a measure of the volume of packet transmissions through a client per unit time. For

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<sup>1</sup> “The present invention has been implemented using radio modems produced by GRE America, Inc. which operate on a spread spectrum technology, and which provide good receiver sensitivity and repeater capabilities . . . The Gina brand radio modems further include error detection and correction, can operate in asynchronous or synchronous modes, and can support data speed from 300 to 64 kbps.”

<sup>2</sup> “It will therefore be appreciated that the wireless network system of the present invention is constantly attempting to optimize itself for the “best” data transmission . . . Also, some radio links may be less robust or may be slower than other links, such that optimization may result in a routing of data around the less robust or slower links, even though it may increase the number of hops to the server 16.”

example, the specification of the ‘516 Patent at Column 9, lines 11-15<sup>3</sup> and at Column 12, lines 39-41<sup>4</sup> discusses traffic from packet transmissions.

12. With respect to the term “path to the gateway through the most robust additional clients” of claims 1, 6, and 15 of the ‘516 Patent, it is my opinion that a person of ordinary skill in the art would understand this term to mean “the path to the gateway through the most reliable clients or through the clients having the greatest ability to maintain communication under adverse conditions, including but not limited to factors such as: signal strength; battery life; link quality; and susceptibility to malfunctions.” As described in the claims and ‘516 Patent specification, the robustness of clients is a factor that may be used to optimize packet transmission. See, e.g., Claims 1, 6, and 15; Col. 9, ll. 16-24; Col. 5, ll. 16-18.<sup>5</sup> Based on my understanding of the term “robust” and the specification of the ‘516 Patent, that term is used to describe the reliability of the client, or its ability to maintain communications under adverse conditions. For example, Column 2, lines 63-64 defines robustness: “. . . robustness (i.e. the ability to maintain communication with the network under adverse conditions).” A person of ordinary skill in the art would understand that factors affecting robustness, within the context of the ‘516 Patent would include: signal strength; battery life; link quality; and susceptibility to malfunctions.

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<sup>3</sup> “For example, the traffic of data packets through a particular client modem may be large, such that it is better to route the data from neighboring clients through other clients, even though there may be more hops involved with this alternative routing.”

<sup>4</sup> “The advantage of prototyping the system as explained in FIGS. 2a-20 is that further optimizations become apparent. For example, if a great deal of network traffic is going through a particular node, it may be desirable to place a ‘passive repeater’ at that node.”

<sup>5</sup> “Alternatively, the optimization process can also factor in traffic and transmission reliability of the various links to determine the optimal path to the server.”

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct. This declaration is executed this 1st day of June, 2010.

Sam R. Das

Samir R. Das

## **Attachment 1**

## **CURRICULUM VITAE**

SAMIR R. DAS

Professor

Computer Science Department  
Stony Brook University, SUNY  
Stony Brook, NY 11794-4400

Phone: (631)-632-1807 Email: samir@cs.sunysb.edu  
Fax: (631)-632-8334 URL: <http://www.cs.sunysb.edu/~samir>

### **Professional Experience**

*Director, Systems and Infrastructure Division, Center of Excellence on Wireless and Information Technology (CEWIT), Stony Brook University, October 2007 – present.*

*Professor, Computer Science, Stony Brook University, September 2009 – present.*

*Associate Professor, Computer Science, Stony Brook University, September 2002 – August 2009.*

*Associate Professor, Computer Science and Engineering, University of Cincinnati, January 2000 – August 2002.*

*Assistant Professor, Computer Science, The University of Texas at San Antonio, September 1994 – December 1999.*

*Visiting Researcher, Advanced Networking and Security group, Sun Microsystems Lab, Menlo Park, CA, March – July 1999.*

*Graduate Research or Teaching Assistant, College of Computing, Georgia Institute of Technology, Atlanta, 1989-94.*

*Computer Engineer/Research Scientist, Indian Statistical Institute, Calcutta, India, 1988-89.*

### **Education**

*Ph.D. in Computer Science, Georgia Institute of Technology, Atlanta, September, 1994.*

Thesis title: "Performance Issues in Time Warp Parallel Simulations." Advisor: Richard M. Fujimoto.

*Master of Science in Computer Science, Georgia Institute of Technology, Atlanta, September, 1993.*

*Master of Engineering in Computer Science & Engineering, Indian Institute of Science, India, January, 1988.*

*Bachelor of Engineering in Electronics & Telecommunication Engineering, Jadavpur University, India, August, 1986.*

### **Research Interests**

Wireless networking, mobile and pervasive computing, sensor networking.

Simulation and performance evaluation of computer systems and networks.

### **Honors and Awards**

- Best Paper Award, ACM Mobicom, 2007.
- Recognition of Service Award, ACM SIGMOBILE, 2004.
- Promising Inventor Award, The Research Foundation, SUNY, 2004.

- IEEE Computer Society Distinguished Visitor, 2001-03.
- The “Amber” Award, University of Texas at San Antonio Student Ambassadors, in recognition of the outstanding contribution and service to the students, 1999.
- National Science Foundation Faculty Early CAREER Award, 1998.
- Outstanding Graduate Research Assistant Award, College of Computing, Georgia Institute of Technology, 1993.
- National Talent Search Scholarship, National Council of Educational Research and Training, New Delhi, India, 1980-87.
- University Medal (First in class), Jadavpur University, 1986.

### **Grants and Contracts**

1. NY State Energy Research and Development Authority (NYSERDA), 2009-2011, “Wireless Utility Monitoring, Control and Response (MCR) System for Efficient Energy Utilization,” \$622,200, PI: Jon Longtin, Co-PIs: Satya Sharma, Samir Das, Jacob Sharony. (Recommended for funding).
2. Hyundai Motor Corporation, South Korea, 2008-09, “High Speed DMA System for Multimedia Gateway, \$28,000. PI: Samir Das, Co-PI: Sangjin Hong.
3. Konkuk University, South Korea, 2008-09, “Network Management System for Multimedia Gateway,” \$20,000. PI: Samir Das.
4. Laufer Wind Group, 2008-09, “WiFi-based Ad Hoc Networking Solution to Distribute Aircraft Presence Information in Wind Farms,” \$28,000, PI: Samir Das, Co-PI: Jacob Sharony.
5. National Science Foundation, 2008-12, “Collaborative Research: NECO: A Market-Driven Approach to Dynamic Spectrum Sharing,” \$1,000,000, PI: Samir Das, Co-PI: Himanshu Gupta, Milind Buddhikot (Bell Labs), Anil Vullikanti, Madhav Marathe, Achla Marathe (Virginia Tech). SBU portion \$406,000.
6. National Science Foundation, 2008-10, “Collaborative Research: CRI:IAD A Miniaturized Robotic Testbed for Development, Testing, and Evaluation of Protocols for Multi-Hop Wireless Networks,” \$464,836, PI: Tzi-cker Chiueh, Co-PIs: Samir Das, Jennifer Wong, Xin Wang. In collaboration with Kartik Gopalan (SUNY Binghamton). SBU portion \$150,000.
7. National Science Foundation, 2007-10, “NOSS: Declarative Framework for Learning and Evaluating Probabilistic Models of Events in Sensor Networks,” \$350,000, PI: Himanshu Gupta, Co-PIs: Samir Das, IV Ramakrishnan, CR Ramakrishnan, David Warren.
8. National Science Foundation, 2007-10, “III-COR: Deductive Framework for Programming Sensor Networks,” \$449,687, PI: Himanshu Gupta, Co-PIs: Samir Das, IV Ramakrishnan, CR Ramakrishnan, David Warren.
9. National Science Foundation, 2007-09, “NeTS-WN: Collaborative Research: A Measurement-Driven Physical-Interference-Based Approach for the Design of Mesh Networks,” \$400,000, PI: Samir Das. In collaboration with Doug Blough and Mary Ann Ingram (Georgia Tech). SBU portion \$200,000.
10. CICESE-SBU Joint Research Grant – CONACYT Funds from Mexico, 2007-09, “Wireless Ad Hoc and Sensor Network Technologies,” PI: Samir Das. In collaboration with Luis A. Villasenor (CICESE) and Jaime Sanchez (CICESE). One of four projects. SBU portion for this project – \$25,000 (approx).
11. NASA Ames Research Center, 2005-06, “Simulation and Prediction of Events, and Fault-Detection with Sensor Networks,” \$998,765, PI: Satya Sharma, Co-PIs: Arie Kaufman, Samir Das, Imin Kao.
12. National Science Foundation, 2005-09, “Collaborative Research: NeTS-NOSS: RFID-Based Sensor Networks: Exploiting Diversity and Redundancy,” \$506,733, PI: Samir Das. In collaboration with Nitin Vaidya (UIUC). SBU portion: \$228,176.

13. NEC Labs, 2005-07, "Wireless Mesh Networking," \$75,000 (approx), PI: Samir Das. Plus SensorCAT match of \$11,759.
14. NEC Labs, 2005-06, "RFID Protocols," \$25,000, PI: Samir Das.
15. Erallo Technologies, Inc., 2005, "Development of Wireless Capabilities to Vehicle Drug Sensor Systems," \$16,000, PI: Samir Das.
16. NYSTAR/Long Island Association, Millennium Center Development Project, 2005-06, "Wireless Multihop Networking Architecture For Rapidly Deployable Communication Infrastructure," \$205,000, PIs: Arie Kaufman, Samir Das, Tzi-cker Chiueh.
17. National Science Foundation, 2004-07, "U.S.-India Cooperative Research: Multichannel Multihop Wireless LANs for Rapid Deployment," \$28,744, PI: Samir Das.
18. NYSTAR/SensorCAT, 2003-04, "Protocols for Wireless Ad Hoc Networks," \$20,577. PI: Samir Das.
19. Computer Associates, 2003-04, "Mesh Networks for Wireless Devices," \$82,885. PI: Samir Das.
20. OBR Computing Research Award, University of Cincinnati, 2001-02, "Ad Hoc Sensor Networks," \$16,200, PI: Samir Das.
21. National Science Foundation, 2002-06, "Exploiting Spatial and Channel Diversity in Mobile Ad Hoc Networks," \$229,991, PI: Samir Das.
22. National Science Foundation, 1999-2003, "Collaborative Proposal: Protocols for Mobile Ad Hoc Networks," \$304,188, PI: Samir Das, Co-PI: Asis Nasipuri (UNC-Charlotte). In collaboration with Nitin Vaidya (Texas A&M). Total SBU portion \$172,022.
23. National Science Foundation Faculty Early CAREER Award, 1998-2003, "Parallel Discrete Event Simulation – Protocols, Tools and Applications," \$220,000, PI: Samir Das.
24. Texas Advanced Technology Program (ATP) Award, 1998-1999, "Design and Performance Evaluation of Wireless Networking Protocols," \$160,677, PI: Samir Das, Co-PIs: Sumit Roy and Nitin Vaidya (Texas A&M). Texas A&M had a separate budget.
25. National Science Foundation, 1996-1998, "Research in Parallel Computer Systems Design Using Workstation Clusters with High-Speed Networks," \$51,546 PI: Kleanthis Psarris, Co-PIs: Samir Das and Raj Boppana.
26. National Science Foundation, 1996-2001, "Building an Academic Pipeline for Minority Scholars," \$1,277,995. PI: R. Hiromoto, Co-PIs: Clint Jeffery, Samir Das, Raj Boppana, Kleanthis Psarris, Jon Weissman, Bruce Rosen.
27. Air Force Office of Scientific Research, 1996-2000, "Telecommunication Networks for Mobile and Distributed Communications/Computing," \$2,000,000, PI: Sumit Roy, Co-PIs: R. Hiromoto, Samir Das, Raj Boppana, GVS Raju, Weiming Lin.

### **Professional Services and Activities**

- Member of the Editorial Board:
  - *IEEE/ACM Transactions on Networking*, 2004 – 2009.
  - *IEEE Transactions on Mobile Computing*, 2005 – present.
  - *ACM/Springer Wireless Networks Journal*, 2005 – 2008.
  - *Ad Hoc Networks Journal*, Elsevier Science Pub., 2002 – 2007.
  - Guest Editor: *Computer Communications*, Elsevier Science Pub., Special Issue on Recent Advances in Mobile Communication Networks, March 2000.

- Chair/Vice-Chair of the Technical Program Committee:
  - TPC Vice-chair, Wireless and Mobile Computing Track, *International Conference on Parallel Processing (ICPP)* Portland, OR, 2008.
  - TPC Co-chair, *International Conference on Distributed Computing and Networking (ICDCN)*, Guwahati, India, December, 2006.
  - TPC Co-chair, *IEEE Workshop on Wireless Mesh Networks (WiMesh)*, Reston, VA, September 2006.
  - TPC Co-chair, *ACM MobiCom Conference* – International Conference on Mobile Computing and Networking , Philadelphia, PA, September 2004.
  - TPC Co-chair, *International Workshop on Distributed Computing (IWDC)*, Kolkata, India, December 2003.
  - TPC Co-chair, *ACM MobiHoc Symposium* — Symposium on Mobile Ad Hoc Networking and Computing, October 2001.
- Member of the Technical Program Committee (Selected):
  - ACM MobiCom– International Conference on Mobile Computing and Networking, 2003–2010.
  - IEEE Infocom Conference, 2008–2009.
  - IEEE ICNP –International Conference on Network Protocols, 2009.
  - MDM – International Conference on Mobile Data Management, 2009.
  - IEEE DySpan Symposium on Dynamic Spectrum Access Networks, 2008–10.
  - ACM MobiHoc – International Symposium on Mobile Ad Hoc Networking and Computing, 2000–02, 2006–07.
  - IEEE ICDCS – International Conference on Distributed Computing Systems, 2001, 2003–04, 2007.
  - IEEE SECON – International Conference on Sensor and Ad Hoc Communications and Networks, 2004, 2006–07, 2009.
  - IEEE/ACM MASCOTS – International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems, 1996, 2000, 2002–03.
  - IEEE/ACM/SCS PADS – Workshop on Parallel and Distributed Simulation, 1996–2003.
  - ACM MSWiM – International Workshop on Modeling, Analysis and Simulation of Wireless and Mobile Systems, 1999, 2002.
- Proposal Reviewer:
  - NSF review panel member – CISE/ITR Networking panel 2000, 2001; CISE/ITR Operating Systems and Compiler panel 2001; CISE Networking Special Projects Panel 2002; CISE/ACR Software panel 2002; CISE/ANIR CAREER panel 2002,2003; EHR/CREST panel 2003, CISE/NeTS panel 2005, CISE/NeTS panel 2009.
  - Reviewer, New York State Office of Science, Technology and Academic Research (NYSTAR) Proposals, 2001.
  - Reviewer, Michigan 21st Century Jobs Fund proposals, 2006.
  - Reviewer, Indiana 21st Century Research and Technology Funds proposals, 2006.
- Panelist:
  - Vehicular networking panel, IEEE/Create-Net *MobiQuitous* Conference, Philadelphia, Aug 2007.
  - Wireless networking panel, WOCC Conference, Newark, NJ, April 2005.
  - Quality Education for Minorities (QEM) Network Workshop for NSF's CAREER Program, March 2003, March 2004.

## **Publications**

### **In book chapters**

1. V. Navda, A. Kashyap and S. R. Das, "Design and Evaluation of iMesh: an Infrastructure-mode Wireless Mesh Network," In Marco Conti, Jon Crowcroft and Andrea Passarella, editors, *Mobile Ad Hoc Networks: from Theory to Reality*, Nova Science Publishers, 2007.
2. A. Nasipuri and S. R. Das, "Multi-channel MAC Protocols for Mobile Ad Hoc Networks," In A. Boukerche, editor, *Algorithms and Protocols for Wireless and Mobile Networks*, CRC Press, 2005.
3. M. K. Marina and S. R. Das, "Routing in Mobile Ad Hoc Networks," In P. Mohapatra and S. Krishnamurthy, editors, *Ad Hoc Networks: Technologies and Protocols*, Springer Verlag, 2004.

### **In refereed journals**

1. M. K. Marina, S. R. Das and A. P. Subramanian, "A Topology Control Approach for Utilizing Multiple Channels in Multi-Radio Wireless Mesh Networks," *Computer Communications*, to appear.
2. Z. Zhou, H. Gupta and S. R. Das, "Variable Radii Connected Sensor Cover in Sensor Networks," *ACM Transactions on Sensor Networks*, Vol. 5, No. 1, Feb 2009, pages 1-36.
3. A. P. Subramanian and S. R. Das, "Addressing Deafness and Hidden Terminal Problems in Directional Antenna based Wireless Multi-Hop Networks," to appear in *ACM/Springer Wireless Networks (WINET) Journal*. [Published online Sept 2008.]
4. A. P. Subramanian, H. Gupta, S. R. Das and Jing Cao, "Minimum Interference Channel Assignment in Multi-Radio Wireless Mesh Networks," *IEEE Transactions on Mobile Computing*, Vol. 7, No. 11, November 2008, pages 1459-1473.
5. S. Jain and S. R. Das, "Exploiting Path Diversity in the Link Layer in Wireless Ad-Hoc Networks," *Ad Hoc Networks Journal*, Vol. 6, Issue 5, July 2008, Pages 805-825.
6. N. Vaidya and S. R. Das, "RFID-Based Networks – Exploiting Diversity and Redundancy," *ACM SIGMOBILE Mobile Computing and Communications Review (MC2R)*, Vol. 12, Issue 1, January 2008, Pages 2-14 (Invited paper).
7. B. Tang, H. Gupta and S. R. Das, "Benefit-based Data Caching in Ad Hoc Networks," *IEEE Transactions on Mobile Computing*, Vol. 7, No. 3, March 2008, pages 289-304.
8. V. Navda, H. Gupta, S. R. Das and V. Chowdhary, "Efficient Gathering of Correlated Data in Sensor Networks," *ACM Transactions on Sensor Networks.*, Vol. 4 , No. 1, January 2008, pages 1-31.
9. S. Ganguly, V. Navda, K. Kim, A. Kashyap, D. Niculescu, R. Izmailov, S. Hong and S. R. Das, Performance Optimizations for Deploying VoIP Services in Mesh Networks, *IEEE Journal on Selected Areas in Communications (JSAC)*, Vol. 24, No. 11, 2006, pages 2137-2158.
10. M. K. Marina and S. R. Das, "Ad hoc On-demand Multipath Distance Vector Routing," *Wireless Communications and Mobile Computing (WCMC) Journal*, Vol. 6, No. 7, 2006, pages 969-988.
11. A. Nasipuri and S. R. Das, "Performance of Multi-Channel Wireless Ad hoc Networks," *International Journal of Wireless and Mobile Computing (IJWMC)*, Vol. 1, Nos. 3/4, 2006, pages 191-203.
12. H. Gupta, Z. Zhou, S. R. Das and Q. Gu, "Connected Sensor Cover: Self-Organization of Sensor Networks for Efficient Query Execution," *IEEE/ACM Transactions on Networking*, 2006, Vol. 14, No. 1, January 2006, pages 55-67.
13. V. Kumar and S. R. Das, "Performance of Dead Reckoning-Based Location Service for Mobile Ad Hoc Networks," *Wireless Communications and Mobile Computing (WCMC) Journal*, Vol. 4, No. 2, March 2004, pages 189 - 202.

14. M. K. Marina and S. R. Das, "Impact of MAC and Caching Overheads on Routing Performance in Ad Hoc Networks," *Computer Communications*, Vol. 27, No. 3, February 2004, pages 239-252.
15. R. Castañeda, S. R. Das and M. Marina, "Query Localization Techniques for On-Demand Routing Protocols for Mobile Ad Hoc Networks," *ACM/Kluwer Wireless Networks (WINET) Journal*, Vol. 8, No. 2, March 2002, pages 137-151.
16. A. Nasipuri, R. Castañeda and S. R. Das, "Performance of Multipath Routing for On-Demand Protocols in Ad Hoc Networks," *ACM/Kluwer Mobile Networks (MONET) Journal*, Vol. 6, No. 4, 2001, pages 339-349.
17. C. E. Perkins, E. M. Royer S. R. Das and M. Marina, "Performance Comparison of Two On-demand Routing Protocols for Ad Hoc Networks," *IEEE Personal Communications*, Vol. 8, No. 1 February 2001, pages 16-29.
18. S. R. Das, "Adaptive Protocols for Parallel Discrete Event Simulation," *Journal of the Operational Research Society (JORS)*, Vol. 51, Issue 4, April 2000, pages 385-394.
19. S. R. Das, R. Castañeda and J. Yan, "Simulation Based Performance Evaluation of Mobile, Ad Hoc Network Routing Protocols," *ACM/Baltzer Mobile Networks (MONET) Journal*, Vol. 5, No. 3, July 2000, pages 179-189.
20. S. R. Das and R. M. Fujimoto, "Adaptive Memory Management and Optimism Control in Time Warp," *ACM Transactions on Modeling and Computer Simulation*, Vol. 7, No. 2, April 1997, pages 239-271.
21. S. R. Das and R. M. Fujimoto, "An Empirical Evaluation of Performance-Memory Trade-offs in Time Warp," *IEEE Transactions on Parallel and Distributed Systems*, Vol. 8, No. 2, February 1997, pages 210-224.
22. I. F. Akyildiz, L. Chen, S. R. Das, R. M. Fujimoto and R. F. Serfozo, "The Effect of Memory Capacity on Time Warp Performance," *Journal of Parallel and Distributed Computing*, Vol. 18, No. 4, August 1993, pages 411-422.
23. G. Lomow, S. R. Das and R. M. Fujimoto, "Mechanisms for User Invoked Retraction of Events in Time Warp," *ACM Transactions on Modeling and Computer Simulation*, Vol. 1, No. 3, July 1991, pages 219-243.
24. S. R. Das, "On the Synthesis of Nonlinear Continuous Neural Networks," *IEEE Transactions on Systems, Man, and Cybernetics*, Vol. 21, No. 2, February 1991, pages 413-418.
25. N. H. Vaidya, S. R. Das, L. M. Patnaik and P. C. Mathias, "A Systolic Algorithm for Hidden Surface Removal," *Parallel Computing*, Vol. 15, No. 1-3, September 1990, pages 277-289.
26. S. R. Das, N. H. Vaidya and L. M. Patnaik, "Design and Implementation of a Hypercube Multiprocessor," *Microprocessors and Microsystems*, Vol. 14, No. 2, March 1990, pages 101-105.

#### **In refereed conference/ workshop proceedings**

1. P. Deshpande, A. Kashyap, C. Sung, S. R. Das, "Predictive Methods for Improved Vehicular WiFi Access," *Proc. ACM MobiSys: 7th ACM International Conference on Mobile Systems, Applications, and Services*, Krakao, Poland, June 2009.
2. R. Maheshwari, J. Cao, S. R. Das, "Physical Interference Modeling for Transmission Scheduling on Commodity WiFi Hardware," *Proc. IEEE INFOCOM 2009 MiniConference*, Rio de Janeiro, Brazil, April 2009.
3. A. P. Subramanian, J. Cao, C. Sung, S. R. Das, "Understanding Channel and Interface Heterogeneity in Multi-channel Multi-radio Wireless Mesh Networks," *Proc. 10th Passive and Active Measurement Conference (PAM 2009)*, Seoul, South Korea, April, 2009.

4. O. Riganelli, R. Grosu, S. R. Das, C. R. Ramakrishnan, S. A. Smolka, "Power Optimization in Fault-Tolerant Mobile Ad Hoc Networks," *Proc. 11th IEEE High Assurance Systems Engineering Symposium (HASE 2008)*, Nanjing, China, December, 2008.
5. R. Maheshwari, S. Jain, S. R. Das, "A Measurement Study of Interference Modeling and Scheduling in Low-Power Wireless Networks," *Proc. ACM SenSys 2008: 6th ACM Conference on Embedded Networked Sensor Systems*, Raleigh, NC, November 2008.
6. A. P. Subramanian, M. Al-Ayyoub, H. Gupta, S. R. Das, M. Buddhikot, "Near-Optimal Dynamic Spectrum Allocation in Cellular Networks," *Proc. IEEE Dynamic Spectrum Access Networks (DySpan) Symposium*, Chicago, IL, October 2008.
7. A. Kashyap, S. Ganguly, S. R. Das, "Measurement-Based Approaches for Accurate Simulation of 802.11-based Wireless Networks," *Proc. 11th ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (MSWiM 2008)*, Vancouver, Canada, October 2008.
8. D. Blough, S. R. Das, G. Resta, P. Santi, "A Framework for Joint Scheduling and Diversity Exploitation under Physical Interference in Wireless Mesh Networks," *Proc. 5th IEEE International Conference on Mobile Ad Hoc and Sensor Systems (MASS 2008)*, Atlanta, GA, September 2008.
9. R. Maheshwari, S. Jain, S. R. Das, "On Estimating Joint Interference for Concurrent Packet Transmissions in Low Power Wireless Networks," *Proc. 3rd ACM International Workshop on Wireless Network Testbeds, Experimental Evaluation and Characterization (WiNTECH 2008)*, San Francisco, CA, September 2008.
10. A. P. Subramanian, V. Navda, P. Deshpande and S. R. Das, "A Measurement Study of Inter-Vehicular Communication Using Steerable Beam Directional Antenna," *Proc. ACM VANET (Vehicular Internet-working) Workshop*, San Francisco, September 2008.
11. A. P. Subramanian, P. Deshpande, J. Gao and S. R. Das, "Drive-by Localization of Roadside WiFi Networks," *Proc. IEEE Infocom 2008 Conference*, Phoenix, AZ, April 2008.
12. H. Gupta, Z. Zhou, S. R. Das and X. Zhu, "Slotted Scheduled Tag Access in Multi-Reader RFID Systems," *Proc. IEEE ICNP (International Conference on Network Protocols)*, Beijing, China, October, 2007.
13. A. Kashyap, S. R. Das and S. Ganguly, "Measurement-based Modeling of Link Capacities in 802.11-based Wireless Networks," *Proc. ACM MobiCom: 13th ACM Annual International Conference on Mobile Computing and Networking*, Montreal, Canada, September 2007.
14. V. Navda, A. P. Subramanian, K. Dhanasekaran, A. Timm-Giel, S. R. Das, "MobiSteer: Using Directional Antenna Beam Steering to Improve Performance of Vehicular Internet Access," *Proc. ACM MobiSys: 5th ACM International Conference on Mobile Systems, Applications, and Services*, San Juan, Puerto Rico, June 2007 (**Best Paper Award**).
15. S. Jain, S. R. Das, H Gupta, "Distributed Protocols for Scheduling and Rate Control to achieve Max-Min Fairness in Wireless Mesh Networks," *Proc. IEEE WoWMoM (International Symposium on a World of Wireless, Mobile and Multimedia Networks)*, Helsinki, Finland, June 2007.
16. A. P. Subramanian, H. Gupta, S. R. Das, "Minimum-Interference Channel Assignment in Multi-Radio Wireless Mesh Networks," *Proc. IEEE SECON (4th IEEE International Conference on Sensor and Ad Hoc Communications and Networks)*, San Diego, CA, June 2007.
17. R. Maheshwari, J. Gao and S. R. Das, "Detecting Wormhole Attacks in Wireless Networks using Connectivity Information," *Proc. IEEE Infocom 2007 Conference*, Anchorage, Alaska, May 2007.
18. A. Kashyap, S. Ganguly, S. R. Das and S. Banerjee, "VoIP on Wireless Meshes: Models, Algorithms and Evaluation," *Proc. IEEE Infocom 2007 Conference*, Anchorage, Alaska, May 2007.

19. A. Timm-Giel , A. P. Subramanian, K. Dhanasekaran, V. Navda, S. R. Das, "Directional Antennas for Vehicular Communication - Experimental Results," *Proc. Spring 2007 IEEE Vehicular Technology Conference (VTC)*, Dublin, Ireland, April 2007.
20. A. P. Subramanian, M. Buddhikot, H. Gupta, S. R. Das, "Fast Spectrum Allocation in Coordinated Dynamic Spectrum Access Based Cellular Networks," *Proc. IEEE Symposium on Dynamic Spectrum Access Networks (DySpan)*, Dublin, Ireland, April 2007.
21. A. P. Subramanian and S. R. Das, "Addressing Deafness and Hidden Terminal Problem in Directional Antenna based Wireless Multi-Hop Networks," *Proc. 2nd IEEE/Create-Net/ICST International Conference on Communication System Software and Middleware (COMSWARE)*, Bangalore, India, January 2007.
22. B. Tang, S. R. Das, H. Gupta. "Benefit-based Data Caching in Ad-Hoc Networks," *Proc. IEEE ICNP (International Conference on Network Protocols)*, Santa Barbara, CA, November 2006, pages 208–217.
23. S. Jain and S. R. Das, "Collision Avoidance in a Dense RFID Network," *Proc. 1st ACM International Workshop on Wireless Network Testbeds, Experimental Evaluation and Characterization (WiNTECH 2006)*, Los Angeles, CA, Sept 2006. In conjunction with ACM MobiCom 2006.
24. R. Maheshwari, H. Gupta and S. R. Das, "Multichannel MAC Protocols for Wireless Networks," *Proc. IEEE SECON (3rd IEEE International Conference on Sensor and Ad Hoc Communications and Networks)*, Reston, VA, Sept 2006.
25. U. Kumar, H. Gupta, S. R. Das, "A Topology Control Approach to Using Directional Antennas in Wireless Mesh Networks," *Proc. IEEE International Conference on Communications (ICC)*, Istanbul, June 2006.
26. S. Jain and S. R. Das, "MAC Layer Multicast in Wireless Multihop Networks," *Proc. 1st International Conference on Communication System Software and Middleware (COMSWARE)*, New Delhi, India, January 2006.
27. B. Tang, S. R. Das, and H. Gupta, "Cache Placement in Sensor Networks Under Update Constraint," *Proc. 4th International Conference on Ad Hoc Networks and Wireless (ADHOC-NOW)*, Cancun, Mexico, October, 2005.
28. M. K. Marina and S. R. Das, "A Topology Control Approach to Channel Assignment in Multi-Radio Wireless Mesh Networks," *Proc. 2nd International Conference on Broadband Networks (BroadNets)*, Oct 2005, pages 381-390.
29. Z. Zhou, S. R. Das, H. Gupta, "Fault Tolerant Connected Sensor Cover with Variable Sensing and Transmission Ranges," *Proc. IEEE SECON (2nd IEEE International Conference on Sensor and Ad Hoc Communications and Networks)*, Santa Clara, Sept 2005.
30. H. Gupta, V. Navda, V. Chowdhary and S. R. Das, "Efficient Gathering of Correlated Data in Sensor Networks," *Proc. ACM MobiHoc: 6th ACM International Symposium on Mobile Ad Hoc Networking and Computing*, Urbana, May 2005, 402–413.
31. S. Jain and S. R. Das, "Exploiting Path Diversity in the Link Layer in Wireless Ad Hoc Networks," *Proc. IEEE WoWMoM (International Symposium on a World of Wireless, Mobile and Multimedia Networks)*, Taormina, Italy, June 2005, pages 22–30.
32. V. Navda, A. Kashyap and S. R. Das, "Design and Evaluation of iMesh: an Infrastructure-mode Wireless Mesh Network," *Proc. IEEE WoWMoM (International Symposium on a World of Wireless, Mobile and Multimedia Networks)*, Taormina, Italy, June 2005, pages 164–170.
33. Z. Zhou, S. R. Das and H. Gupta, "Variable Radii Connected Sensor Cover in Sensor Networks," *Proc. IEEE SECON (1st IEEE International Conference on Sensor and Ad Hoc Communications and Networks)*, Santa Clara, Oct 2004, pages 387–396.

34. S. Patil, S. R. Das and A. Nasipuri, "Serial Data Fusion Using Space-filling Curves in Wireless Sensor Networks," *Proc. IEEE SECON (1st IEEE International Conference on Sensor and Ad Hoc Communications and Networks)*, Santa Clara, Oct 2004.
35. Z. Zhou, S. R. Das and H. Gupta, "Connected K-Coverage Problem in Sensor Networks," *Proc. 13th Int. Conf. on Computer Communications and Networks (IC3N)*, Chicago, Oct 2004.
36. R. Gupta and S. R. Das, "Tracking Moving Targets in a Smart Sensor Network," *Proc. Fall 2003 IEEE Vehicular Technology Conference (VTC)*, Orlando, October 2003.
37. H. Gupta, S. R. Das and Q. Gu, "Connected Sensor Cover: Self-Organization of the Sensor Network for Efficient Query Execution," *Proc. ACM MobiHoc: 4th ACM International Symposium on Mobile Ad Hoc Networking and Computing* Annapolis, Maryland, June 2003, pages 189-200.
38. A. Agarwal and S. R. Das, "Dead Reckoning in Mobile Ad Hoc Networks," *Proc. IEEE Wireless Communications and Networking Conference (WCNC 2003)*, New Orleans, March 2003.
39. N. Gupta and S. R. Das, "Energy-Aware On-Demand Routing for Mobile Ad Hoc Networks," *Springer Lecture Notes in Computer Science: LNCS 2571: Proc. 4th International Workshop on Distributed Computing (IWDC 2002)*, Kolkata, India, December 2002, pages 164-173.
40. C. Cordeiro, S. R. Das and D. P. Agrawal, "COPAS: Dynamic Contention-Balancing to Enhance the Performance of TCP over Multi-hop Wireless Networks," *Proc. 10th Int. Conf. on Computer Communication and Networks (IC3N)*, Miami, October, 2002, pages 382-387.
41. A. Joshi and S. R. Das, "Efficient Queueing Policies for Mobile Ad Hoc Networks," *Proceedings of IEEE Networks 2002 (Joint Conference: IEEE ICWLHN 2002 and IEEE ICN 2002)*, Atlanta, August 2002.
42. M. Marina and S. R. Das, "Routing Performance in Presence of Unidirectional Links in Multihop Wireless Networks," *Proc. ACM MobiHoc: 3rd ACM International Symposium on Mobile Ad Hoc Networking and Computing*, Lausanne, Switzerland, June 2002, pages 12-23.
43. M. Marina and S. R. Das, "On Demand Multipath Distance Vector Routing in Ad Hoc Networks," *Proc. IEEE ICNP (International Conference on Network Protocols)*, Riverside, Nov. 2001, pages 14-23.
44. N. Gupta and S. R. Das, "A Capacity and Utilization Study of Mobile Ad Hoc Networks," *Proc. 26th Annual IEEE Conference on Local Computer Networks*, Tampa, Nov. 2001, pages 576-583.
45. N. Jain, S. R. Das and A. Nasipuri, "A Multichannel MAC Protocol with Receiver-Based Channel Selection for Multihop Wireless Networks," in *Proc. 9th Int. Conf. on Computer Communications and Networks (IC3N)*, Phoenix, Oct. 2001, pages 432-439.
46. K. Jones and S. R. Das, "Time-Parallel Algorithms for Simulation of Multiple Access Protocols," in *Proc. 9th. International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2001)*, Cincinnati, Ohio, August 2001, pages 49-58.
47. M. Marina and S. R. Das, "Performance of Route Caching Strategies in Dynamic Source Routing," in *Proc. 2nd. International Workshop of Wireless Networks and Mobile Computing (WNMC 2001)*, appeared as a part of the *Proc. 21st IEEE International Conference on Distributed Computing Systems (ICDCS) Workshops*, Mesa, Arizona, April 2001, pages 425-432.
48. K. Jones and S. R. Das, "Parallel Execution of a Sequential Network Simulator," in *Proc. 2000 Winter Simulation Conference (WSC)*, Dec 2000, pages 418-424.
49. A. Nasipuri and S. R. Das, "Multichannel CSMA with Signal Power-Based Channel Selection for Multihop Wireless Networks," in *Proc. IEEE Vehicular Technology Conference (VTC)*, Boston, Sept. 2000.
50. S. Desilva and S. R. Das, "Experimental Evaluation of a Wireless Ad Hoc Network," in *Proc. 9th. IEEE International Conference on Computer Communications and Networks (IC3N)*, Las Vegas, Oct. 2000, pages 528-534.

51. S. R. Das, C. E. Perkins and E. M. Royer, "Performance Comparison of Two On-demand Routing Protocols for Ad Hoc Networks," *Proceedings of IEEE INFOCOM 2000 Conference*, Tel-Aviv, Israel, March 2000, pages 3–12.
52. A. Nasipuri and S. R. Das, "On-demand Multipath Routing for Mobile Ad Hoc Networks," *Proc. 8th. IEEE International Conference on Computer Communications and Networks (IC3N)*, Boston, Oct. 1999, pages 64–70.
53. A. Nasipuri, J. Zhuang and S. R. Das, "A Multichannel CSMA MAC Protocol for Multihop Wireless Networks," *Proc. IEEE Wireless Communications and Networking Conference (WCNC)*, New Orleans, September, 1999.
54. R. Castañeda and S. R. Das, "Query Localization Techniques for On-Demand Routing Protocols for Mobile Ad Hoc Networks," *Proc. ACM MobiCom: 5th International Conference on Mobile Computing and Networking*, Seattle, August, 1999, pages 186–194.
55. S. G. Dykes, C. L. Jeffery and S. R. Das, "Taxonomy and Design Analysis for Distributed Web Caching," *Proc. Hawaii International Conference on System Sciences*, Maui, Hawaii, January 1999.
56. K. Jones and S. R. Das, "Combining Optimism Limiting Schemes in Time Warp Based Parallel Simulations," *Proc. 1998 Winter Simulation Conference*, Washington, DC, Dec. 1998, pages 499–505.
57. S. Desilva and S. R. Das, "Experimental Evaluation of Channel State Dependent Scheduling in an In-building Wireless LAN," *Proc. 7th. IEEE International Conference on Computer Communications and Networks (IC3N)*, Lafayette, LA, Oct 1998, pages 414–421.
58. S. R. Das, R. Castañeda, J. Yan and R. Sengupta, "Comparative Performance Evaluation of Routing Protocols for Mobile, Ad hoc Networks," *Proc. 7th. IEEE International Conference on Computer Communications and Networks (IC3N)*, Lafayette, LA, Oct 1998, Lafayette, LA, pages 153–161.
59. S. R. Das, "Adaptive Protocols for Parallel Discrete Event Simulation," *Proc. 1996 Winter Simulation Conference*, Coronado, CA, December 1996, pages 186–193.
60. C. Jeffery, S. R. Das and G. Bernal, "Proxy-sharing Proxy Servers," *Proc. 1st Conference on Emerging Technologies and Applications in Communications (etaCOM)*, Portland, May 1996, pages 116–119.
61. S. R. Das, "Estimating the Cost of Throttled Execution in Time Warp," *Proc. 10th Workshop on Parallel and Distributed Simulation*, Philadelphia, May 1996, pages 186–189.
62. S. R. Das, R. M. Fujimoto, K. Panesar, D. Allison and M. Hybinette, "GTW: A Time Warp System for Shared Memory Multiprocessors," *Proc. 1994 Winter Simulation Conference*, Orlando, Florida, December 1994, pages 1332–1339.
63. J.-J. Tsai, S. R. Das and R. M. Fujimoto, "Parallel Execution of Communication Network Simulators," *Proc. 1994 IMACS World Congress on Computational and Applied Mathematics*, Atlanta, Georgia, July 1994.
64. S. R. Das and R. M. Fujimoto, "An Adaptive Memory Management Protocol for Time Warp Parallel Simulation," *Proc. 1994 ACM SIGMETRICS Conference on Measurement and Modeling of Computer Systems*, Nashville, Tennessee, May 1994, pages 201–210.
65. R. Rönngren, R. Ayani, R. M. Fujimoto and S. R. Das, "Efficient Implementation of Event Sets in Time Warp," *Proc. 7th Workshop on Parallel and Distributed Simulation*, San Diego, May 1993, pages 101–108.
66. S. R. Das and R. M. Fujimoto, "A Performance Study of the Cancelback Protocol for Time Warp," *Proc. 7th Workshop on Parallel and Distributed Simulation*, San Diego, May 1993, pages 135–142.
67. I. F. Akyildiz, L. Chen, S. R. Das, R. M. Fujimoto and R. F. Serfozo, "Performance Analysis of "Time Warp" with Limited Memory," *Proc. 1992 ACM SIGMETRICS and Performance'92 Conference on Measurement and Modeling of Computer Systems*, Newport, Rhode Island, June 1992, pages 213–224.

68. S. R. Das, R. M. Fujimoto and J. T. Stasko, "Animating the Execution of Time Warp Programs," (poster paper) *Proc. 6th Workshop on Parallel and Distributed Simulation*, Newport Beach, California, January 1992, pages 195–196.
69. G. Lomow, S. R. Das and R. M. Fujimoto, "User Cancellation of Events in Time Warp," *Proc. 5th Workshop on Parallel and Distributed Simulation*, Anaheim, California, January 1991, pages 55-62.
70. N. H. Vaidya, S. R. Das, P. C. Mathias and L. M. Patnaik, "A Systolic Algorithm for Scanline-based Hidden Surface Removal," *Proc. Third International Conference on Supercomputing*, Boston, May 1988, pages 239–246.

#### **Significant Other Publications**

1. A. Kashyap, S. Ganguly and S. R. Das, "A Measurement-Based Model for Estimating Transmission Capacity in a Wireless Mesh Network," in *Proc. 1st ACM International Workshop on Wireless Network Testbeds, Experimental Evaluation and Characterization (WiNTECH 2006)*, Los Angeles, CA, Sept 2006. In conjunction with ACM MobiCom 2006.
2. S. Patil and S. R. Das, "Poster Abstract: Serial Data Aggregation Using Space-Filling Curves in Wireless Sensor Networks," in *Proc. First ACM Conference on Embedded Networked Sensor Systems (SenSys)*, Los Angeles, November, 2003.
3. M. K. Marina and S. R. Das, "Ad Hoc On Demand Multipath Distance Vector Routing," *ACM SIGMOBILE Mobile Computing and Communications Review (MC2R)*, Volume 6, Issue 3, July 2002, pages 92–93.
4. S. R. Das and S. M. Corson, "Report on the second ACM International Symposium on Mobile Ad Hoc Networking and Computing: (MobiHOC 2001)," *ACM SIGMOBILE Mobile Computing and Communications Review (MC2R)*, Volume 5, Issue 4, October 2001, pages 8–9.
5. A. Mukherjee, D. Saha, S. R. Das and S. Bandyopadhyay, "Guest Editorial – Recent Advances in Mobile Communication Networks," *Computer Communications*, Vol. 23, Issue 5-6, March 2000, pages 439–440.

#### **Internet RFCs**

RFCs are official specification documents of the Internet Protocol suite that are defined by the Internet Engineering Task Force (IETF) and the Internet Engineering Steering Group (IESG).

- C. E. Perkins, E. Belding-Royer and S. R. Das, "Ad Hoc On Demand Distance Vector (AODV) Routing," RFC 3561, July 2003. Available from <http://www.ietf.org>.

#### **Software developed**

- Georgia Tech Time Warp (GTW), 1992-94, licensed by the Georgia Tech Research Corporation (GTRC), co-developed with Richard Fujimoto. GTW is an optimized implementation of the Time Warp parallel simulation mechanism for shared memory multiprocessors. This software has been used by several university and industry research projects to build large-scale, parallel simulators for computer and telecommunication networks and transportation systems. Further development has continued in Georgia Tech.
- AODV simulation model on *ns-2* network simulator, co-developed with graduate student Mahesh Marina. This simulator is widely used by mobile ad hoc networking community for experiments.

#### **Invited Talks, Colloquia and Tutorials**

- Modeling and Mitigating Interference in Multi-Hop Wireless Networks
  - Tutorial at Future Internet Summer School, University of Bremen, Germany, July 2009.
  - Tutorial at European Wireless 2009, Aalborg, Denmark, May 2009 (co-taught).
  - Tutorial at ACM MobiCom 2008, San Francisco, Sept 2008 (co-taught).

- MobiSteer: Using Directional Antenna Beam Steering for Vehicular Network Access
  - University of Bremen, Germany, June 2008.
  - Ohio State University, May 2008.
  - University of Memphis, Feb 2008.
  - Ajou University, South Korea, Nov 2007.
  - Seoul National University, South Korea, Nov 2007.
  - NSF's Mobility in Wireless Networks Workshop, Rutgers University, July 2007.
- Wireless Networking Technologies for Developing Regions
  - Indian Institute of Management, Kolkata (Calcutta), India, Jan 2008.
- Measurement-Based Modeling of Link Capacities in 802.11 Wireless Networks
  - Hong Kong Polytechnic University, July 2007.
  - AAAS Annual Meeting, NSF wireless networking panel, San Francisco, Feb 2007.
  - HP Labs, Palo Alto, Feb 2007.
  - IEEE Computer Communications Workshop (CCW), Pittsburgh, Feb 2007.
  - University of California, Davis, Dec 2006.
- Channel Assignment in Multi-Radio Wireless Mesh Networks: Algorithms and Practical Approaches
  - University of Illinois, Urbana-Champaign, Oct 2006.
  - Georgia Tech, Oct 2006.
- Wireless Mesh Networking
  - Invited Lecture, IEEE ComSoc Kolkata Chapter, Jadavpur University, India, July 2008.
  - Tutorial at IEEE Globecom 2006, San Francisco, Dec 2006 (co-taught).
  - Lecture at IEEE Computer Society Long Island Chapter, Nov 2006.
  - Lectures at CNR, Pisa, Italy, May 2006.
  - Tutorial at ACM MobiHoc 2006, Florence, Italy, May 2006 (co-taught).
  - Tutorial at IEEE Infocom 2006, Barcelona, Spain, April 2006.
  - Tutorial at Comsware 2006, New Delhi, India, Jan 2006 (co-taught).
  - Tutorial at IEEE International Conference on Network Protocols (ICNP), Boston, Nov 2005.
- Design and Evaluation of an Infrastructure-mode Multi-radio Wireless Mesh Network
  - Bell Labs, Murray Hill, NJ, Sept 2005.
  - Dartmouth College, July 2005.
  - University of Bremen, Germany, June 2005.
  - NEC Research, Princeton, June 2005.
  - Philips Research, New York, Jan 2005.
  - Jadavpur University, Invited Lecture by IEEE ComSoc, Calcutta Chapter, January 2005.
- Stony Brook Wireless Mesh Router
  - Microsoft Research Mesh Networking Summit, Seattle, June 2004.
- Wireless Sensor Networks
  - Seminar, IEEE Computer Society Long Island Chapter, May 2003.
- Simulation of Large-Scale Wireless Ad Hoc Networks
  - Invited talk, Simulation Day, University at Albany-SUNY, Oct 2002.

- On-Demand Multipath Routing in Mobile Ad Hoc Networks
  - SUNY-Stony Brook, April 2002.
  - Oregon Graduate Institute, March 2002.
  - Purdue University, Sept 2001.
  - École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, July 2001.
- Mobile Ad Hoc Networks
  - Colloquium lecture, Center for Development of Advanced Computing (CDAC), Pune, India, Dec 2003.
  - IEEE Computer Society Distinguished Visitor lecture, IEEE Computer Society Long Island Chapter, Aug 2002.
  - IEEE Computer Society Distinguished Visitor lecture, University of Louisville, Sept 2001.
  - Tutorial talk, Advance Computing and Communications (ADCOM) Conference, Kochin, India, Dec 2000.
  - Tutorial talk, 2000 IEEE International Conference on Personal Wireless Communications (ICPWC), Hyderabad, India, Dec 2000.
- Query Control Techniques for On Demand Routing in Mobile Ad Hoc Networks
  - Systems seminar, University of Kentucky, Lexington, Nov 2000.
- Design and Simulation of Efficient Protocols for Mobile Ad Hoc Networks
  - University of Cincinnati, March 1999.
  - Iowa State University, Ames, April 1999.
  - University of Minnesota, Twin Cities, May 1999.
- Parallel and Distributed Simulation
  - Invited talk, National Workshop on Distributed Computing, Jadavpur University, Jan 1999.
  - Invited talk, High Performance Computing Workshop, Indian Statistical Institute, December 1998.
- Comparative Performance Evaluation of Routing Protocols in Mobile, Ad Hoc Networks
  - Invited talk, Workshop on Modeling and Simulation in Wireless Systems (held in conjunction with MASCOTS'98), Montreal, July 1998.
- Parallel Discrete Event Simulation: Adaptive Protocols and Applications.
  - University of North Texas, Denton, Feb 1998.
  - University of Texas at Dallas, March 1998.
  - Penn State University, March 1998.
  - Southern Methodist University, Dallas, April 1998.
- Issues in Mobile/Wireless Networking
  - Invited lecture (local IEEE chapter), Jadavpur University, Calcutta, India, Dec 1997.
- Adaptive Protocols for Parallel Discrete Event Simulation
  - University of Georgia, Athens, Feb 1994.
  - Iowa State University, Ames, March 1994.

- University of California, Riverside, March 1994.
- University of California, Santa Barbara, April 1994.
- Dartmouth College, April 1994.
- Louisiana Tech, Reston, April 1994.
- University of Texas at San Antonio, May 1994.

## **Graduate Students**

- **Ph.D. Students Graduated —**

- Anand Prabhu Subramanian, “Improving Capacity and Connectivity in Wireless Access Networks.” May 2009. Current job: Member of Technical Staff, Alcatel-Lucent Bell Labs, Murray Hill, NJ.
- Ritesh Maheshwari, “Medium Access and Security Protocols for Wireless Multihop Networks.” April 2009. Current job: Member of Technical Staff, Akamai, Cambridge, MA.
- Anand Kashyap, “Measurement-based Modeling of Interference in WiFi Networks: Techniques and Applications,” October 2008. Current job: Member of Technical Staff, Symantec Research Labs.
- Vishnu Navda, “Cross-layer Design for Interference Mitigation and Mobility Support in Wireless Access Networks,” November 2007. Current job: Member of Technical Staff, Microsoft Research, India.
- Shweta Jain, “Efficient Medium Access Protocols for Wireless and RFID Networks,” July 2007. Current job: Postdoc at WINLAB, Rutgers University.
- Zongheng Zhou, “Improving Energy Efficiency and Performance of Sensor and RFID Networks by Exploiting Spatial Redundancy,” September 2006. Current job: Member of Technical Staff, Ask.com.
- Mahesh K. Marina, “Routing and Channel Assignment in Multihop Wireless Networks: Protocols and Performance Issues,” August 2004. Current job: Assistant Professor, School of Informatics, University of Edinburgh, UK.
- Robert Castañeda, “Protocols for Mobile Ad Hoc Networking,” August 2000. Current job: Faculty Member, St. Philip’s College, San Antonio, Texas.

- **Ph.D. Students In Progress —**

- Pralhad Deshpande. Topic: Vehicular networks.
- Utpal Paul. Topic: Interference in wireless networks.
- Fatima Zarinni. Topic: MAC protocols in wireless networks.

- **M.S. Thesis Students Graduated —**

- Naveen Ramaraj, “Location Based Activity Recognition Using Mobile Phones,” Spring 2009. (First job: Akamai).
- Umesh Kumar, “Directional Antenna based Topology Control in Ad Hoc Networks,” Summer 2005. (First job: Amazon.com).
- Swapnil Patil, “Serial Data-aggregation in Wireless Sensor Networks,” Summer 2004. (First Job: NEC Research, Princeton, NJ).
- Manish Shukla, “TCP Performance on Multipath Ad Hoc networks,” Fall 2003. (First job: Opnet, Bethesda, MD).
- Archana Mohanty, “Design and Evaluation of Bluetooth Intra-Piconet Scheduling Algorithms to Support Scatternets,” Spring 2003. (First job: Xilinx, Colorado).

- Sireesha Kadambari, "Using Tracking and Buffering to Improve Delivery Performance in Mobile Ad Hoc Networks," Spring 2003. (First job: Nokia, San Diego).
- Sumeet Talwar, "Performance Evaluation of Multihop, Multichannel Wireless Networks," Spring 2003. (First job: Lexis-Nexis, Dayton).
- Vijay Kumar, "Dead Reckoning Location Service for Mobile Ad Hoc Networks," Fall 2002. (First job: Texas Instruments, Berlin).
- Rahul Gupta, "Experimental Study of Wireless Ad Hoc Networks," Fall 2002. (First Job: Epic Systems, Madison).
- Srikanth Malladi, "Arena Exploration by an Ad Hoc Network of Mobile Robots," Summer 2002. (First job: Microsoft, Redmond).
- Aarti Agrawal, "Query Control and Location-based Techniques for Mobile Ad Hoc Networks," Fall 2001. (First job: Aruba Wireless, San Jose).
- Avinash Joshi, "Load Balancing, Queueing and Scheduling Techniques for Ad Hoc Networks," Fall 2001. (First job: Mesh Networks, Orlando).
- Nitin Jain, "Multichannel CSMA Protocols for Ad Hoc Networks," Summer 2001. (First job: Motorola, Chicago).
- Nishant Gupta, "Resource Management in Mobile Ad Hoc Networks," Summer 2001. (First job: Opnet, Bethesda, MD).
- Steven Keen, "High-Performance MPI on ATM Networks," Fall 1997.